REMARKS

Claims 1-4, 6, and 23-37 are all the claims pending in the application. Claims 5 and 7-22 are canceled, above, pursuant to previous restriction and election of species requirements, and claims 23-37 are added to further define the invention. Claims 1-4 and 6 stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

I. The Prior Art Rejections

Claims 1 and 3-4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Pfeiffer, et al. (U.S. Patent No. 4,417,203), hereinafter referred to as Pfeiffer, in view of Deutsch, et al. (U.S. Patent No. 4,933,635), hereinafter referred to as Deutsch. Claims 2 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Pfeiffer, in view of Deutsch, in further view of Freed (U.S. Patent No. 3,781,683). Applicants respectfully traverse these rejections based on the following discussion.

A. The Rejection Based on Pfeiffer and Deutsch

Applicants respectfully traverse this rejection because the prior art of record does not teach or suggest placing non-functional test structures such that they intersect the cut lines and will remain in the final structure after it is cut to allow testing and inspection, even after the kerf region is removed. To the contrary, the reference (Freed) utilized to demonstrate that test

structures can be formed in the kerf regions, indicates that the test structures will be removed during the dicing operation (see Freed column 8, lines 4-6). Therefore, in Freed, the entire test structure is removed when the kerf region is removed. None of the prior art of record illustrates a structure where part of the test structures remain to allow the test structures be accessed even after the device is diced.

More specifically, this rejection utilizes Pfeiffer for a general teaching regarding testing of greensheets and utilizes Deutsch to teach test devices located around the periphery of an integrated circuit. While the Office Action argues that Pfeiffer and Deutsch are in the same art field and that their teachings could be combined, Applicants respectfully disagree. More specifically, the art of integrated circuit chip manufacture is substantially different from the manufacturing processes involved when making greensheets. Further, there is no indication in either reference (or any other teaching of record) that would cause one ordinary skill in the art to take the teachings relating to greensheets and apply that to teachings relating to integrated circuit chips. Therefore, Applicants initially noted that a prima facie case of obviousness has not been made.

Irrespective of whether a prima facie case of obviousness has been made, Applicants note that neither Pfeiffer nor Deutsch teach or suggest forming the test structures in the kerf regions of the greensheets. To the contrary, Freed is used in an attempt to demonstrate such teaching in the following rejection. Therefore, since neither Pfeiffer nor Deutsch teach or suggest forming test structures in the kerf regions, the proposed combination of references cannot teach or suggest the claimed structure where the "non-functional test structures intersect trim/cut lines along which

said ceramic greensheet will be divided". and where with the "non-functional test structures remain as part of the final structure of said the ceramic greensheet after said ceramic greensheet is divided into final sizes" as defined by independent claim 1.

Thus, the invention adds non-functional test structures to the mask to be screened onto the layer during screening. These test structures are placed to intersect the laminate trim line and in the 'kerf' areas through which the laminate is cut into the smaller substrates, and/or on the edge just between the kerf region and the functional areas. Each layer in the multi-layer greensheets is provided unique test structures that are based to reflect the requirements of that particular layer. Thus, the invention identifies any errors induced by design or screening for each layer based on separate testing requirements.

The invention provides a method for making non-intrusive measurements of manufactured line widths and spacings. The inventive methodology does not require changes to current design practices or manufacturing processes (except for the addition of the test structures and the testing (observation) processes). For each particular layer, the line widths, spacings, and wire orientations used in the actual circuitry of that layer form the basis for the test structures for that layer. Thus, each layer in the multi-layer ceramic structure will potentially include different test structures having different line widths, spacings, etc. In order to test line widths, spacings, etc. the invention can polish the side of the substrate and analyzes vias microscopically. Alternatively, the test structures can be analyzed electrically, via probing.

In order to check or test the spacing and size of wires in functional wiring modules, the invention only needs to examine the non-functional test structures as exposed by cutting the

multi-module greensheet along the laminate trim line or by dicing of the greensheet into individual modules. The non-functional wires have the same design spacing, size, and angles as wires in the functional wiring modules. Therefore, the non-functional test structures comprise representative wires of wires in the functional wiring modules.

Therefore, is Applicants position that the proposed combination of references does not teach or suggest the invention defined by independent claim 1. Further, dependent claims 3 and 4 are similarly patentable, not only because they depend from patentable independent claim 1, but also because of the additional features they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

A. The Rejection Based on Pfeiffer, Deutsch and Freed

Applicants respectfully traverse this rejection because the prior art of record does not teach or suggest placing non-functional test structures such that they intersect the cut lines and will remain in the final structure after it is cut to allow testing and inspection, even after the kerf region is removed. To the contrary, the reference (Freed) utilized to demonstrate that test structures can be formed in the kerf regions, indicates that the test structures will be removed during the dicing operation (see Freed column 8, lines 4-6). Therefore, in Freed, the entire test structure is removed when the kerf region is removed. None of the prior art of record illustrates a structure where part of the test structures remain to allow the test structures be accessed even after the device is diced.

As shown above, neither Pfeiffer nor Deutsch teach or suggest forming the test structures in the kerf regions of the greensheets. To the contrary, Freed is used in an attempt to demonstrate such teaching in the following rejection. However, in column 8, first full paragraph (lines 4-6) Freed explicitly requires that the test circuits that are located in the kerf regions are removed during the dicing of the chips where Freed states ". . . kerf test circuit configurations for the characterization of devices which circuitry is removed during the dicing of a wafer into chips . . ". Applicants submit that this clear teaching in Freed requires that when the test circuits are placed in the kerf regions that they are fully and completely removed in the dicing process taught by Freed. Further, there is no indication in any of the prior art of record of placing the test structures such that they intersect the cut lines as in the claimed invention or of allowing portions of test structures that are placed in the kerf regions to remain after the dicing process.

Therefore, since neither Pfeiffer, Deutsch, nor Freed teach or suggest forming test structures to intersect the kerf regions, the proposed combination of references cannot teach or suggest the claimed structure where the "non-functional test structures intersect trim/cut lines along which said ceramic greensheet will be divided" and where with the "non-functional test structures remain as part of the final structure of said the ceramic greensheet after said ceramic greensheet is divided into final sizes" as defined by independent claim 1.

Thus, it is Applicants position that the proposed combination of references does not teach or suggest the invention defined by independent claim 1. Further, dependent claims 2 and 6 are similarly patentable, not only because they depend from patentable independent claim 1, but also because of the additional features they define. In view of the foregoing, the Examiner is

respectfully requested to reconsider and withdraw this rejection.

II. Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-4, 6, and 23-37, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,

Dated: 12/7/04

Frederick W. Gibb, III
Registration No. 37,629

McGinn & Gibb, PLLC
2568-A Riva Road
Suite 304
Annapolis, MD 21401
(410) 573-1545
Customer Number: 29154
10/604,933